

Instructor: Heidi Houston

Office: ZHS 101

Office Hours: Wed 3-5PM or by appt.

Contact Info: houstonh@usc.edu

Course Description

We will explore our modern understanding of subduction zones from an interdisciplinary perspective. The class will consist of a series of discussions on recent and classic scientific papers as well as lectures on outstanding scientific questions related to subduction zones. The class will emphasize the mechanics of how tectonic motion is accommodated by seismic and aseismic transient slip along the subducting plate interface. We may also discuss the seismicity and dynamics of subduction volcanic arcs. Student interest will influence the selection of topics.

Learning Objectives

At the end of the course, students will be able to:

- critically read, analyze and discuss scientific papers, the main currency of modern science
- provide an interdisciplinary perspective on subduction zones, which are sites of the largest and most devastating earthquakes globally
- understand the current scientific challenges in studying tectonic motion at subduction zones, including the megathrust earthquake cycle

Required Reading

A selection of scientific papers outlined below in the weekly course schedule. Students will be expected to read approximately 3 papers per week.

Class Format

After the first week, each extended class period will start with a discussion of the scientific papers assigned for that week's reading, which will be led by one or two students. Following the discussion and a short break, the instructor will then lecture, introducing background concepts and previous results to provide context for the next week's readings.

Grades

The students will be evaluated on their participation during discussions every week, the discussions that they lead, and a presentation on a topic of their choice. All students will then submit a short paper (5-8 pages) on their topic at the end of the course (Dec 8), with an outline due Nov 17, and an abstract due Dec 1. Grading breakdown - 15% participation, 45% student-led presentation/discussion, 25% paper, 15% presentation of paper. *Doing well in the class* - Students will be expected to critically read the scientific papers assigned every week and to participate in the discussions.

Weekly Course Schedule

	Tuesday	Sampling of readings
Week 1	Aug 25: Discovering the hazard of a subduction zone	Heaton and Hartzell, Atwater
Week 2	Sep 1: Global survey of subduction zones and great earthquakes	Ekstrom, Meiers et al, Ye et al
Week 3	Sep 8: How we observe plate motions	Métois et al.
Week 4	Sep 15: Subduction zone seismicity and double seismic zones	Brudzinski et al.
Week 5	Sep 22: The puzzle of deep earthquakes	Houston, Zhan
Week 6	Sep 29: Brittle-to-ductile transition	Byerlee, Gao and Wang
Week 7	Oct 6: Slow slip and tremor in subduction zones	Obara, Rogers and Dragert
Week 8	Oct 13: No class - Fall Break	
Week 9	Oct 20: Friction on the plate interface	Fulton et al., Hardebeck
Week 10	Oct 27: Fluids in subduction zones	Audet et al.
Week 11	Nov 3: The M9.1 Tohoku earthquake	Kato et al., Lay et al.
Week 12	Nov 10: Plate geometry, age and roughness	Wang and Bilek
Week 13	Nov 17: Subduction and the mantle convection system	Conrad and Lithogow-Bertelloni, Crameri et al.
Week 14	Nov 24: No class - Thanksgiving	
Week 15	Dec 1: Volcano seismicity and dynamics	John et al. White et al.
Week 16	Dec 8: Student presentations	Paper due

Student Accessibility Services

Students requesting academic accommodations based on a disability are required to register with the Office of Student Accessibility Services (OSAS) each semester. A letter of verification for approved accommodations can be obtained from OSAS. Please be sure the letter is delivered to the instructor as early in the semester as possible. OSAS is located in Room 120 Grace Ford Salvatori Hall, and is open 8:30 am - 5:00 pm, Monday through Friday. The phone number is (213) 740-0776; their email is ability@usc.edu. The website is osas.usc.edu.

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. engemannshc.usc.edu/counseling

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. engemannshc.usc.edu/rsvp

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: sarc.usc.edu

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. equity.usc.edu

Bias Assessment Response and Support

Incidents of bias, hate crimes, or aggression need to be reported allowing for appropriate investigation and response. studentaffairs.usc.edu/bias-assessment-response-support

The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. dsp.usc.edu

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. studentaffairs.usc.edu/ssa

Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. diversity.usc.edu

USC Emergency Information

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Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. emergency.usc.edu

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour emergency or to report a crime.

Provides overall safety to USC community. dps.usc.edu